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ABSTRACT

The Secondary and University Education Section of the National Heart and Blood Vessel Research and Demonstration Center (NRDC) at Baylor College of Medicine completed a statewide survey of Texas public secondary school teachers of biology, health education, homemaking, and physical education. The survey ascertained: (1) the status of cardiovascular disease education; (2) a disparity between what is and what ought to be taught; (3) teachers' preparation to teach about cardiovascular diseases and associated risk factors; and (4) teachers' experience with self-instructional materials. Results of the survey have been used to develop a cardiovascular disease education curriculum and accompanying teachers' guidebook. (Author)

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CARDIOVASCULAR DISEASE EDUCATION IN TEXAS PUBLIC SECONDARY SCHOOLS -- A NEEDS ASSESSMENT

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Abstract

Cardiovascular Disease Education in Texas Public Secondary Schools--A Needs Assessment (EVA)

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The Secondary and University Education Section of the National Heart and Blood Vessel Research and Demonstration Center (NRDC*) at Baylor College of Medicine completed a statewide survey of Texas public secondary school teachers of biology, health education, homemaking, and physical education. The survey ascertained: (1) the status of cardiovascular disease education, (2) a disparity between what is and what ought to be taught, (3) teachers' preparation to teach cardiovascular diseases and associated risk factors and (4) teachers' experience with self-instructional materials. Results of the survey have been utilized to develop a cardiovascular disease education curriculum and accompanying teachers' guidebook.

*A grant supported research project of the National Heart, Lung and Blood Institute, National Insitutes of Health, Grant No. HL17269.

Introduction:

Established at Baylor College of Medicine, Houston, Texas, in January, 1975, the nation's first National Heart and Blood Vessel Research and Demonstration Center (NRDC)* is responsible for integrating basic and clinical research with education and demonstration programs in an attempt to bridge the gulf between basic medical research and community health practices. One of the sections of the NRDC Education Division is the Secondary and University Education Section.

The primary goal of the Section is to increase students' knowledge awareness of the generally accepted risk factors associated with cardiovascular disease. The development of a Cardiovascular Curriculum Education Project (CCEP), designed for secondary school students, is part of an effort to achieve this purpose. CCEP (see Figure 1), accompanied by a curriculum guidebook for teachers consists of self-instructional education modules on cardiovasdular diseases and associated risk factors. As a preventive approach to disease control, CCEP is designed to educate and influence the behavior of students to the extent that heart and blood vessel disease morbidity and mortality rates will be reduced through adoption of appropriate health behavior. A more immediate goal is to modify students' behavior relative to the associated risk factors of heart disease.

A self-study or programmed instructional method was chosen by the Secondary and University Education Section as the format for its curriculum on cardiovascular diseases and associated risk factors. This format was selected for a number of reasons. The efficacy of self-instruction for teaching congnitive information has been well documented (DeCecco, 1964 and Glaser, 1965). Self-pacing has been accepted as a viable educational principle (Mitzel, 1971, Talmadge, 1975, and Fitzpatrick, 1970) and a number of studies have shown that independent

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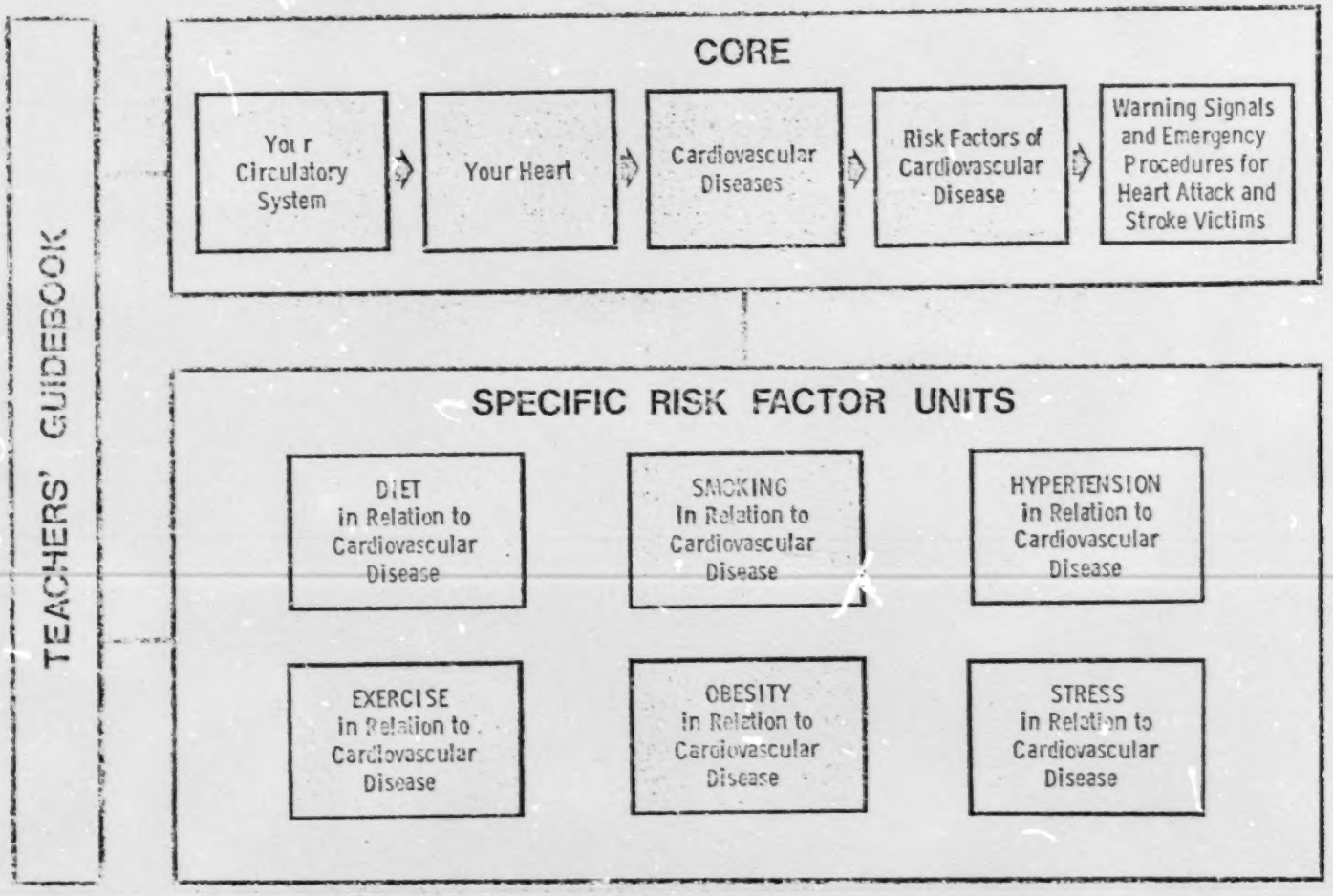
TEACHERS' GUIDEBOOK
CORE
Your Circulatory System
Your Heart
Cardiovascular Diseases
Risk Factors of Cardiovascular Disease
Warning Signals and Emergency Procedures for Heart Attack and Stroke Victims
SPECIFIC RISK FACTOR UNITS
DIET in Relation to Cardiovascular Disease
SMOKING in Relation to Cardiovascular Disease
HYPERTENSION in Relation to Cardiovascular Disease
EXERCISE in Relation to Cardiovascular Disease
OBESITY in Relation to Cardiovascular Disease
STRESS in Relation to Cardiovascular Disease

Figure 1. Cardiovascular Curriculum Education Project (CCEP)

study in the form of programmed instruction requires less time to complete than more traditional methods (Silberman, 1962; Schramm, 1964; Attiyeh, Bach and Lumsden, 1969; and Lange, 1972).

The Section also recognized that teaching is still mostly group centered and teacher directed with few provisions made for the variation in interests, abilities, in learning rate and learning style among students (Burkman, 1972). It was decided that utilizing a self-study mode would allow teachers to be more flexible in responding to such student variations. Studies on achievement and individual differences with use of programmed instruction have shown that intelligent students and the more creative students do complete programmed materials more quickly and with better posttest scores than others (William, 1965), although, such differences are also evident with other instructional methodologies. Jamison et al. (1974) have stated that programmed instruction is generally as effective as more traditional instructional methodologies.

The extent to which Texas secondary school teachers utilized self-instruction, however, was not known. In addition, the actual time spent and that preferred for teaching topics of cardiovascular diseases and associated risk factors was not known. Because the implementation of CCEP will depend on the acceptability of teachers to its format and potential use, a statewide survey of Texas public secondary school teachers was conducted to obtain information which would facilitate the development and implementation of the Project.

Purpose:

The present study was designed to answer the following four major questions regarding the current status and future needs of teaching cardiovascular diseases (CVD) and associated risk factors (ARF) in Texas public secondary school biology, health education, homemaking and physical education classes: 1) How much time is spent on teaching CVD and ARF? (2) How much time is desired

for the teaching of CVD and ARF? (3) What are teachers' preceptions regarding the adequacy of their academic preparation for teaching CVD and ARF? and (4) To what extent are self-instructional materials used in the classroom? Other questions of concern included how teachers would utilize the CCEP, what specific cardiovasuclar subject areas were of interest to them, and what specific items and/or activities would be suggested as important for inclusion in the teachers' instructional management system (i.e., teachers' curriculum guidebook). Teachers of biology, health education, homemaking and physical education were selected for this study since it was determined that it was in their classes that cardiovascular disease related topics had either been traditionally taught or would be appropriate course content.

Methodology:

A 32 item questionnaire was designed to elicit specific information on: (1) the amount of time (classroom periods per year - CP/Y) which emphasized the cardiovasuclar system, cardiovascular diseases, and associated risk factors--diet, exercise, hypertension, obesity, smoking and stress; (2) the amount of time that teachers would like to spend on these topics; (3) teachers' perceptions of their academic preparation to teach CVD and ARF; and (4) teachers' experience with and present use of self-instructional educational materials, as well as their attitudes concerning the appropriateness of self-instruction for high school students.

The questionnaire was mailed with a pre-stamped, self-return envelope to a random sample of 1154 (15 percent) secondary school teachers of biology, health education, homemaking and physical education in the state of Texas (N= 7690). The Texas Education Agency's Division of Research cooperated in identifying the

population sampled. A letter explaining the NRDC and the purpose of the survey accompanied the questionnaire. Follow-up letters were mailed to non-respondents to encourage their participation in the study.

Homogeneity of variance, t-tests, chi-square tests, and analysis of variance statistical procedures were employed to analyze the data.

Results:

Demographic Data

A total of 536 (46.45 percent) of the teachers responded to the survey instrument. They were predominantly male (55.9 percent) although statistical significance (X^2 = 37.68, d.f. = 3, $p < .01$) was revealed. For example, more than 60 percent of the health education teachers were male whereas 100 percent of the homemaking teachers were female. The greatest percentage of the teachers were between the ages of 20-29, although statistical significance was revealed (X^2 = 27.38, d.f. = 12, $p < .01$). A toal of 37.4 percent were between the ages of 20-29, 35.5 percent between 30-39, 20.3 percent between 40-49, 5.4 percent between 50-59 years of age, and 1.5 percent were 60 years of age or older. Whereas 51.2 percent of the biology teachers possessed masters degrees, 37.6 percent of the physical education, 35.2 percent of the health education and 9.1 percent of the homemaking teachers possessed master degrees (X^2= 23.58, d.f.= 3, $p < .01$). Forty percent of master degree holders reported obtaining their degrees in a field other than in their major teaching area. Although 52.3 percent of the physical education masters degree holders obtained their degree in physical education, 53.5 percent of the biology teachers and 57.1 percent of the homemaking teachers obtained their masters degree in education. Fifty-seven percent of the health education teachers obtained their masters degree in physical education.

The teachers taught in a community with a population of 25,000 - 50,000 (44.2 percent); taught under a quarter system of 12 weeks (95.3 percent); taught classes with enrollments of less than 30 students (62.8 percent); taught classes of 55 minutes duration (86.3 percent) and 13.6 percent taught classes grouped according to student abilities. Non-significance was revealed on community size, quarter system, and length of class. Statistical significance was revealed on class size (X^2= 60,99, d.f.= 6, $p < .01$) and student grouping (X^2= 43.78, d.f. =3, $p < .01$). Whereas 80.5 percent of the biology teachers and 100 percent of the homemaking teachers had less than 30 students per class, only 58.1 percent of the health education and 43.1 percent of the physical education teachers had less than 30 students per class. Less than nine percent of the health education, homemaking and physical education classes were grouped according to student ability while 26.2 percent of the biology classes were grouped. In their respective disciplines, biology, and homemaking teachers taught an average of three classes per quarter while health and physical education teachers taught an average of two classes per quarter.

Current Time Allotment

Among the four grade levels of biology, a mean of 8.21 classroom periods per year (cp/y) was spent on the cardiovascular system while a mean of 2.46 cp/y was spent on CVD (see Table 1). A mean of 1.13 cp/y was spent on each of the risk factors with more emphasis on diet, smoking and exercise ($\bar{X}$= 1.40 cp/y) than on obesity, hypertension and stress ($\bar{X}$= .86 cp/y). Analysis of variance procedures revealed no statistically significant differences among grade levels for the amount of time devoted to the cardiovascular system, cardiovascular diseases and associated risk factors.

Table 1

MEAN CLASSROOM PERIODS PER YEAR DEVOTED TO THE CARDIOVASCULAR SYSTEM, CARDIOVASCULAR DISEASES AND ASSOCIATED RISK FACTORS AS REPORTED BY GRADE LEVEL BY BIOLOGY TEACHERS

Grade Level	n	TOPICS							
		C.V.S.[a] $\bar{X}$	C.V.D.[b] $\bar{X}$	Smoking $\bar{X}$	Diet $\bar{X}$	Obesity $\bar{X}$	Hypertension $\bar{X}$	Stress $\bar{X}$	Exercise $\bar{X}$
9	36	7.50	2.39	1.33	1.42	.93	.74	.88	1.44
10	149	7.09	2.33	1.87	1.70	1.04	1.03	.94	1.34
11	17	9.41	2.85	1.26	1.64	.91	.65	.91	1.14
12	36	8.89	2.24	1.13	1.46	.73	.77	.77	1.10

[a] Cardiovascular System

[b] Cardiovascular Diseases

Table 2

MEAN CLASSROOM PERIODS PER YEAR DEVOTED TO THE CARDIOVASCULAR SYSTEM, CARDIOVASCULAR DISEASES AND ASSOCIATED RISK FACTORS AS REPORTED BY GRADE LEVEL BY HEALTH EDUCATION TEACHERS

Grade Level	n	TOPICS							
		C.V.S.[a] $\bar{X}$	C.V.D.[b] $\bar{X}$	Smoking $\bar{X}$	Diet $\bar{X}$	Obesity $\bar{X}$	Hypertension $\bar{X}$	Stress $\bar{X}$	Exercise $\bar{X}$
9	112	4.37	3.13	3.49	2.35	1.90	1.55	1.38	2.96
10	68	5.86	4.79	3.40	2.63	2.26	1.96	1.53	3.11
11	33	5.60	4.75	3.68	2.87	2.25	1.84	1.78	2.87
12	32	6.18	4.12	3.32	2.56	2.10	1.85	1.81	2.94

[a] Cardiovascular System

[b] Cardiovascular Diseases

Table 3

MEAN CLASSROOM PERIODS PER YEAR DEVOTED TO THE CARDIOVASCULAR SYSTEM, CARDIOVASCULAR DISEASES AND ASSOCIATED RISK FACTORS AS REPORTED BY GRADE LEVEL BY HOMEMAKING TEACHERS

Grade Level	n	TOPICS							
		C.V.S.[a] $\bar{X}$	C.V.D.[b] $\bar{X}$	Smoking $\bar{X}$	Diet $\bar{X}$	Obesity $\bar{X}$	Hypertension $\bar{X}$	Stress $\bar{X}$	Exercise $\bar{X}$
9	16	.38	.13	1.00	2.22	1.61	.31	.53	1.24
10	10	.90	.33	.90	2.42	1.82	.55	.82	1.18
11	13	1.23	1.46	1.21	2.80	2.73	1.07	1.00	1.13
12	12	1.17	1.07	1.25	2.64	2.50	.77	1.15	1.23

[a] Cardiovascular System

[b] Cardiovascular Diseases

Table 4

MEAN CLASSROOM PERIODS PER YEAR DEVOTED TO THE CARDIOVASCULAR SYSTEM, CARDIOVASCULAR DISEASES AND ASSOCIATED RISK FACTORS AS REPORTED BY GRADE LEVEL BY PHYSICAL EDUCATION TEACHERS

Grade Level	n	TOPICS							
		C.V.S.[a] $\bar{X}$	C.V.D.[b] $\bar{X}$	Smoking $\bar{X}$	Diet $\bar{X}$	Obesity $\bar{X}$	Hypertension $\bar{X}$	Stress $\bar{X}$	Exercise $\bar{X}$
9	133	.75	.42	.82	.56	.68	.23	.32	2.58
10	134	.54	.19	.58	.57	.54	.23	.24	2.87
11	95	1.17	.95	.71	.74	.55	.32	.29	3.50
12	79	.59	.39	.57	.60	.41	.23	.22	2.51

[a] Cardiovascular System

[b] Cardiovascular Diseases

Among the four grade levels of health education, a mean of 5.50 cp/y was spent on the cardiovascular system while a mean of 4.20 classroom periods per year was spent on cardiovascular diseases (see Table 2). A mean of 2.43 cp/y was spent on each of the risk factors with more emphasis on smoking, exercise and diet ($\bar{X}$= 3.02 cp/y) than on obesity, hypertension and stress ($\bar{X}$= 1.85 cp/y). Analysis of variance procedures revealed no statistically significant differences among grade levels for the amount of time devoted to the cardiovasuclar system, CVD and ARF.

Among the four grade levels of homemaking, a mean of .92 cp/y was spent on the cardiovascular system while a mean of .75 cp/y was spent on CVD (see Table 3). A mean of 1.42 cp/y was spent on each of the risk factors with more emphasis on diet, obesity and exercise ($\bar{X}$= 1.96 cp/y) than on smoking, stress and hypertension ($\bar{X}$= .88 cp/y). Analysis of variance procedures revealed no statistically significant differences among grade levels for the amount of time devoted to the cardiovascular system, and ARF. However, Scheffé post hoc comparisions revealed that significantly more cp/y were being devoted to the cardiovascular diseases in the 11th and 12th grades than in 9th and 10th grade classes ($F= 9.35$, d.f.= 3/47, $p < .01$).

Among the four grade levels of physical education, a mean of .76 cp/y was spent on the cardiovascular system while a mean of .49 cp/y was spent on cardiovascular diseases (see Table 4). A mean of .86 cp/y was spent on each of the risk factors with more emphasis on exercise ($\bar{X}$= 2.87 cp/y) than on smoking, diet, obesity, hypertension and stress ($\bar{X}$= .48 cp/y). Analysis of variance procedures revealed no statistically significant differences among grade levels for the amount of time devoted to the cardiovascular system.

Anaylsis of variance procedures revealed a statistically significant difference among the four disciplines in terms of the amount of time devoted to the circulatory system ($F= 31.38$, d.f.= 3/1972, $p < .01$). Scheffé post hoc comparisons showed that

health education and biology teachers devote significantly more time to the cardiovascular system than do homemaking and physical education teachers.

Regarding the current time being devoted to the cardiovascular diseases, analysis of variance procedures revealed a statistically significant difference ($F = 26.31$, d.f. = 3/1972, $p < .01$). Among the four disciplines, Scheffé post hoc comparisons revealed that significantly more time is being devoted to CVD by health education teachers than by biology, homemaking and physical education.

Among the individual risk factors, significantly more time was spent on smoking by health education teachers ($F = 28.51$, d.f. = 3/1972, $p < .01$), on diet by homemaking and health education teachers ($F = 13.34$, d.f. = 3/1972, $p < .01$); on hypertension by health education teachers ($F = 15.42$, d.f. = 1972, $p < .01$) and on exercise by physical education and health education teachers ($F = 10.927$, d.f. = 3/1972, $p < .01$). No significant differences were revealed among the teachers on obesity and stress.

Preferred Time Allotment

A mean of 9.88 cp/y was reported by biology teachers as the amount of time preferred for teaching the cardiovascular system and a mean of 4.76 cp/y was desired for teaching CVD (see Table 5). A mean of 4.42 cp/y was preferred for teaching the risk factors. Statistically significant differences (t-test, p .01) occurred between tenth grade teachers actual time allotment spent on the cardiovascular system and that which was desired. In addition, statistically significant differences (t-test, p .05) occurred between tenth and twelfth grade teachers' actual time allotment spent on CVD and that which was desired (see Table 5). There were no statistically significant differences among grade levels in terms of the amount of time preferred for the cardiovascular system, CVD and ARF.

Table 5

MEAN CLASSROOM PERIODS DEVOTED AND DESIRED TO BE DEVOTED PER YEAR TO CARDIOVASCULAR SYSTEM AND RELATED DISEASES REPORTED BY GRADE LEVEL BY BIOLOGY TEACHERS

Grade Level	Cardiovascular System						Cardiovascular Diseases					
	n	Actually Devoted		Desired to be Devoted		t-Test	n	Actually Devoted		Desired to be Devoted		t-Test
		X̄	S.D.	X̄	S.D.			X̄	S.D.	X̄	S.D.	
9	36	7.50	9.98	10.41	14.95	1.93	38	2.39	3.84	5.18	10.12	1.96
10	149	7.09	8.10	8.81	10.41	2.76**	149	2.33	2.49	4.24	4.60	5.78*
11	17	9.41	14.32	10.35	10.93	.60	20	2.65	3.22	5.35	6.91	1.71
12	36	8.89	10.86	9.94	8.89	-1.03	37	2.24	2.73	4.27	5.48	2.56*

*p<.05
**p<.01

Table 6

MEAN CLASSROOM PERIODS DEVOTED AND DESIRED TO BE DEVOTED PER YEAR TO CARDIOVASCULAR SYSTEM AND RELATED DISEASES REPORTED BY GRADE LEVEL BY HEALTH EDUCATION TEACHERS

Grade Level	Cardiovascular System						Cardiovascular Diseases					
	n	Actually Devoted		Desired to be Devoted		t-Test	n	Actually Devoted		Desired to be Devoted		t-Test
		X̄	S.D.	X̄	S.D.			X̄	S.D.	X̄	S.D.	
9	110	4.37	2.91	6.42	4.49	4.98**	111	3.13	2.63	4.89	4.04	4.52**
10	65	5.86	6.95	7.80	6.53	1.91	68	4.79	7.24	6.65	7.12	1.96
11	35	5.60	5.12	8.20	6.50	2.90**	35	4.35	4.97	6.61	6.61	1.56
12	33	6.18	5.01	8.58	6.49	2.50*	32	5.17	4.24	6.56	6.43	2.03

*p<.05
**p<.01

Table 7

MEAN CLASSROOM PERIODS DEVOTED AND DESIRED TO BE DEVOTED PER YEAR TO CARDIOVASCULAR SYSTEM AND RELATED DISEASES REPORTED BY GRADE LEVEL BY HOMEMAKING TEACHERS

Grade Level	Cardiovascular System						Cardiovascular Diseases					
	n	Actually Devoted		Desired to be Devoted		t-Test	n	Actually Devoted		Desired to be Devoted		t-Test
		X̄	S.D.	X̄	S.D.			X̄	S.D.	X̄	S.D.	
9	16	.38	.62	2.00	1.71	4.10**	15	.13	.35	1.87	1.30	4.67**
10	10	.90	.74	2.50	1.72	2.85*	9	.33	.71	2.00	1.41	3.02*
11	13	1.23	.83	2.85	2.23	2.44*	13	1.46	1.05	2.46	2.26	2.28*
12	12	1.17	.84	2.92	2.61	2.43*	13	1.07	.86	2.31	1.49	3.00*

*p<.05
**p<.01

Table 8

MEAN CLASSROOM PERIODS DEVOTED AND DESIRED TO BE DEVOTED PER YEAR TO CARDIOVASCULAR SYSTEM AND RELATED DISEASES REPORTED BY GRADE LEVEL BY PHYSICAL EDUCATION TEACHERS

Grade Level	Cardiovascular System						Cardiovascular Diseases					
	n	Actually Devoted		Desired to be Devoted		t-Test	n	Actually Devoted		Desired to be Devoted		t-Test
		X̄	S.D.	X̄	S.D.			X̄	S.D.	X̄	S.D.	
9	133	.75	1.64	2.74	4.05	6.31*	132	.42	1.31	1.93	3.55	4.93*
10	134	.34	1.12	3.04	6.40	4.50*	134	.19	.73	2.19	6.11	3.77*
11	95	1.17	6.22	4.02	9.54	3.64*	93	.95	.27	3.30	9.34	3.17*
12	79	.59	1.63	3.62	7.73	3.48*	81	.39	1.57	2.86	7.65	2.90*

*p<.01

A mean of 7.75 cp/y was reported by health education teachers as the amount of time preferred for teaching the cardiovascular system and a mean of 6.18 cp/y was desired for teaching cardiovascular diseases (see Table 6). A mean of 7.40 cp/y was preferred for teaching the risk factors. Statistically significant differences (t-test, $p < .05$) occured between ninth, eleventh and twelfth grade health education teachers' actual time allotment spent on the cardiovascular system and that which was desired. In addition, statistically significant differences (t-test, $p < .01$) occurred between ninth grade teachers' actual time allotment spent on cardiovascular diseases and that which was desired (see Table 6). Analysis of variance procedures revealed no statistically significant differences among grade levels in terms of the amount of time preferred for the cardiovascular system, cardiovascular diseases and associated risk factors.

A mean of 2.57 cp/y was reported by homemaking teachers as the amont of time preferred for teaching the cardiovascular system and a mean of 2.16 cp/y was desired for teaching cardiovascular diseases (see Table 7). A mean of 4.78 cp/y was preferred for teaching the risk factors. Statistically significant differences (t-tests, $p < .05$) occurred between all grade levels of homemaking teachers' actual time allotment spent on the cardiovascular system and CVD and that which was desired (see Table 7). Analysis of variance procedures revealed no statistically significant differences among grade levels in terms of the amount of time preferred for the cardiovascular system, CVD and ARF.

A mean of 3.36 cp/y was reported by physical education teachers as the amount of time preferred for teaching the cardiovascular system and a mean of 2.57 cp/y was desired for teaching CVD (see Table 8). A mean of 3.98 cp/y was preferred for teaching the risk factors. Statistically significant differences (t-test, $p < .01$) occurred between all grade levels of physical education teachers' actual time allotment spent on the cardiovascular system and

CVD and that which was desired (see Table 8). Analysis of variance procedures revealed no statistically significant differences among grade levels in terms of amount of time preferred for the cardiovascular system, CVD and ARF.

Analysis of variance procedures revealed a statistically significant difference among the four disciplines in terms of the amount of time they would like to devote to the circulatory system ($F= 19.91$, $d.f.= 3/1972$, $p < .01$). Scheffé post hoc comparisons revealed that homemaking and physical education teachers wanted to devote significantly more time to teaching the cardiovascular system than did biology and health education teachers.

Regarding the desired amount of time devoted to CVD, analysis of variance procedures revealed a statistically significant difference ($F= 12.50$, $d.f.= 3/1972$, $p < .01$). Scheffé post hoc comparisons revealed that biology, homemaking and physical education teachers wanted to devote significantly more time to teaching CVD than did health education teachers.

Among the individual risk factors, analysis of variance procedures revealed statistically significant differences among disciplines in terms of the amount of time they would like to devote ($F= 11.24$, $d.f.= 3/1972$, $p < .01$). Scheffé comparisons indicated that homemaking teachers would like to devote significantly more time to risk factors than do biology, health , and physical education teachers.

Teacher Academic Preparation

A total of 1.9 percent of the teachers rated their academic preparation to teach the cardiovascular system, cardiovascular diseases and associated risk factors as excellent, 23.7 percent as above average, 52.7 percent as average, 16.7 percent below average, and 5.1 percent as poor. As depicted in Table 9, a chi-square determination revealed significance among the four disciplines ($x^2=24.11$, $d.f.=12$, $p < .05$). Whereas 21.5 percent biology, health education, and physical education teachers reported their academic preparation as below average and poor, 54.5 percent of the homemaking teachers did. There were no statistically significant differences

in teacher's responses according to age, sex, community size and degree type.

Use of Self-Instructional Materials

Inspection of Table 10 shows that 52.9 percent of the teachers had had some or extensive experience with self-instructional or programmed materials, while 47.1 percent had had little or no experience with this type of instruction. Approximately 65 percent of the teachers occasionally use self-instructional materials. No statistically significant differences were revealed among the four disciplines with regard to experience and use, however, masters degree respondents reported statistically significant more experience and greater utilization of self-instructional materials that non masters degree respondents ($X^2 = 13.86$; d.f.= 4, $p < .01$). Age,sex, community size and class size did not exhibit statistically significant differences in relation to teachers' experience or utilitzation of self-instructional materials. Approximately 90 percent felt that self-instructional materials were an appropriate teaching technique for use by high school students. Discipline, age, sex, community size, class size and degree type did not yield statistically significant differences among teachers in terms of their ratings of self-instructional materials as an appropriate teaching methodology for high school students.

A total of 23.4 percent of the teachers reported they would replace a text with CCEP materials, 24.4 percent reported they would replace a lecture, 75 percent would utilize them as supplementary materials, 9.6 percent would use them for homework while 4.9 percent would find other related uses. While no statistically significant differences were attributed to its use in place of text, supplementary material or homework, chi-square determinations revealed significance among the four disciplines in terms of its use in place of a lecture ($X^2 = 32.84$, d.f.= 3, $p < .01$). Whereas

Table 9

CROSSTABULATION OF DISCIPLINE BY TEACHER PREPARATION TO TEACH CARDIOVASCULAR DISEASES AND ASSOCIATED RISK FACTORS

Discipline	Teacher Preparation to Teach Cardiovascular Diseases and Associated Risk Factors				
	Extensive	Above Average	Average	Below Average	Poor
Biology	4	38	89	28	7
Health Education	3	40	75	20	5
Homemaking	0	1	9	7	5
Physical Education	2	36	83	26	8
Column Total	9	115	256	81	25
Percent	1.9	23.7	52.7	16.7	5.1

$x^2 = 24.11$; d.f. 12 ; $p < .05$

Table 10

PERCENTAGE OF TEACHER RESPONDENTS TO ITEMS ASSOCIATED WITH EXPERIENCE, USE AND APPROPRIATENESS OF SELF-INSTRUCTIONAL MATERIALS IN SECONDARY SCHOOLS

Item	Percentage
Experience with Self-Instructional or Programmed Materials:	
Extensive	4.9
Some	48.0
Very Little	38.1
None	9.0
Present Use:	
Extensive	3.7
Occasional	64.5
Never	31.8
Self-Instructional Materials as an Appropriate Teaching Method for High School Students:	
Excellent	9.2
Above Average	35.5
Average	44.8
Below Average	6.9
Poor	3.6

40.9 percent of the homemaking teachers would replace a lecture with CCEP materials, 23.6 percent of the biology, health education and physical education teachers stated they would.

CCEP Curriculum Instructional Units

Teachers reported their interest in the CCEP instructional units (Figure 1) by indicating what specific units they would utilize in their present curriculum. As depicted in Table 11, among the Core Units, "Warning Signals of a Heart Attack" was ranked the highest. Chi-square determinations revealed (X^2= 13.21, d.f.=3, $p < .01$). A total of 80.9 percent of the biology, health education and homemaking teachers selected the unit while 68.2 percent of the physical education teachers expressed interest in the unit. The least frequently selected core unit was the "Risk Factors of Cardiovascular Disease"unit (64.8 percent). A greater interest was revealed by biology and health education (69.5 percent) than by homemaking and physical education teachers (51.5 percent) (X^2= 10.56, d.f.= 3, $p < .05$). Among the other three core units, chi-squre determinations revealed significantly more interest by the biology and health education teachers than by homemaking and physical education teachers. These units were ranked in the following descending order: "Diseases of the Cardiovascular System," (75.3 percent) (X^2= 33.16, d.f.=3, $p < .01$), "The Heart" (73.7 percent) (X^2= 35.22, d.f.= 3, $p < .01$), and "The Circulatory System" (70.6 percent) (X^2= 43.69, d.f.= 3, $p < .01$).

As shown in Table 11, the Supplementary Units were ranked in the following descending order: Smoking (83.2 percent), Exercise (77.5 percent), Obesity (74.3 percent) Diet (73.9 percent), Hypertension (64.4 percent) and Stress (64.2 percent). Chi-square determinations revealed significance among the four disciplines on the Smoking (X^2= 8.65, d.f.= 3, $p < .05$) and Hypertension

Table 11

CROSSTABULATION OF SPECIFIC SELF-INSTRUCTIONAL PACKAGES DESIRED BY PERCENTAGE (AND RANK ORDER) OF TEACHER RESPONDENTS

	Self-Instructional Package	Percentage of Respondents (n = 492)			
		Biology n = 168	Health Education n = 145	Homemaking n = 22	Physical Education n = 157
Core	Circulatory System **	85.1 (3)	74.5 (8)	45.5 (7)	54.8 (12)
	The Heart **	85.1 (4)	77.9 (4)	40.9 (12)	62.4 (8)
	Diseases of the Cardiovascular System **	88.7 (1)	75.9 (6)	63.6 (6)	61.8 (9)
	Risk Factors of Cardiovascular Disease **	71.4 (8)	67.6 (9)	45.5 (8)	58.0 (10)
	Warning Signals of a Heart Attack **	83.9 (5)	81.4 (3)	77.3 (4)	68.2 (5)
Supplementary Units	Diet in Relation to Cardiovascular Disease	76.2 (6)	75.2 (7)	86.4 (1)	69.4 (4)
	Hypertension in Relation to Cardiovascular Disease **	72.6 (7)	67.6 (10)	45.5 (9)	58.0 (11)
	Stress in Relation to Cardiovascular Disease	69.0 (12)	63.4 (12)	45.5 (10)	63.1 (7)
	Exercise in Relation to Cardiovascular Disease	71.4 (9)	82.8 (2)	72.7 (5)	80.3 (1)
	Smoking in Relation to Cardiovascular Disease *	85.7 (2)	88.3 (1)	81.8 (2)	76.4 (2)
	Obesity in Relation to Cardiovascular Disease	70.2 (10)	77.2 (5)	81.8 (3)	75.2 (3)
	Cardiopulmonary Resuscitation (procedure for reviving a heart attack victim)	66.7 (11)	67.2 (11)	45.5 (11)	65.6 (6)

* $p < .05$

** $p < .01$

(X^2= 11.85, d.f.= 3, $p < .01$) Units. Whereas more than 80 percent of the biology, health education and homemaking teachers requested the Smoking Units, 76.4 percent of the physical education teachers did. On the Hypertension Unit more interest was expressed by biology (72.6 percent) and health education teachers (67.6 percent) than by physical education (58.0 percent) and homemaking teachers (45.5 percent).

Teachers' Curriculum Guidebook

Teachers were asked to identify those items they would like included in an instructional management system (i.e. teachers' curriculum guidebook) which will accompany the instructional materials (see Figure 1).

As depicted in Table 12, "Suggested Films" was ranked the highest (86.2 percent). "Supplementary Cardiovascular Content Materials" for teachers was ranked second (72.7 percent), and chi-squre determinations revealed significance among the four disciplines (X^2= 9.37, d.f.=3, $p < .05$). Biology and health education teachers (77.4 percent) identified this item with greater frequency than did homemaking and physical education teachers (66.3 percent). "Suggested Experiments" ranked third with biology teachers having a significantly greater percent of interest (74.4 percent) than health education (62.8 percent), homemaking (54.5 percent) and physical education teachers (54.1 percent) (X^2= 15.37, d.f.= 3, $p < .01$).

As shown in Table 12, the remaining items received a mean of 50 percent or less. Chi-square determinations revealed non-significant differences on all remaining items of the teachers curriculum guidebook except for "role-play" activities (X^2= 19.83, d.f.= 3, $p < .01$). A total of 63.6 percent of the homemaking teachers had identified this item, while 42.8 percent of the health education teachers, 40.1 percent of the physical education teachers,

Table 12

CROSSTABULATION OF SPECIFIC ITEMS DESIRED IN A TEACHERS' CURRICULUM GUIDEBOOK BY PERCENTAGE (AND RANK) OF TEACHER RESPONDENTS

Specific Item	Percentage of Respondents (Rank)			
	Biology n = 168	Health Education n = 145	Homemaking n = 22	Physical Education n = 157
Suggested Texts	43.5 (6)	49.7 (6)	36.4 (7)	41.4 (6)
Supplementary Content Materials for Teachers *	76.2 (2)	78.6 (2)	68.2 (2)	64.3 (2)
Films	87.5 (1)	86.3 (1)	77.3 (1)	84.1 (1)
Bibliography of Articles Related to Subject Area	42.9 (7)	42.8 (7)	27.3 (9)	36.3 (9)
Suggested Supplementary Materials	47.6 (5)	54.5 (4)	31.8 (8)	43.9 (5)
Role Play Activities **	25.0 (9)	42.8 (8)	63.6 (3)	40.1 (7)
Value Clarification Activities	34.5 (8)	42.8 (9)	50.0 (6)	38.2 (8)
Decision Making Activities	48.2 (4)	51.7 (5)	59.1 (4)	48.4 (4)
Suggested Experiments **	74.4 (3)	62.8 (3)	54.5 (5)	54.1 (3)
Other	1.2 (10)	2.1 (10)	0 (10)	1.9 (10)

* $p < .05$

** $p < .01$

and 25.0 percent of the biology teachers identified an interest in role play activities. Following films, supplementary content materials for teachers, and suggested experiments, the remaining items were ranked in the following descending order; decision making activities (50 percent), suggested supplementary materials (47.6 percent) suggested texts (44.5 percent), bibliography of articles related to cardiovascular diseases (40.1 percent), value clarification activities (38.7 percent) and role play activities (36.6 percent).

Discussion:

Despite the availability of state curriculum guidelines for some disciplines, not all disciplines in Texas provide teachers with pre-determined objectives and specified conceptual levels of instruction. Of those that are available (e.g. health education) no time allocations are recommended for suggested topics at both primary and secondary conceptual levels. When one considers the fact that despite the influence of administrators at the state, district and/or department level, teachers largely determine the schools' curriculum, it is important to know the amount of time being devoted to specific topics and the amount teachers would like to devote, in order that existing and/or new curriculum projects can be improved or implemented respectively in already overcrowded curricula. As Doll (1965, p.224) has stated "regardless of grandiose curriculum plans, when the classroom door is closed, the insight and skill of the teachers in largest measure determines the quality of learners' experiences."

The results of the state-wide survey clearly identify within these disciplines, what cardiovascular disease related topics are being taught and how much time is being devoted to the topics in each discipline and grade level. The data show that the majority of the cardiovascular topics were being taught by biology and health education teachers, while homemaking and physical education teachers were teaching topics which traditionally have been considered unique to them (i.e., diet and exercise respectively). The data from this section of the survey reflect a continued emphasis on teaching in these traditional areas. For example, biology teachers teach significantly more on the cardiovascular system, health education teachers teach significantly more on the cardiovascular diseases, homemaking teachers teach significantly more on diet in relation to cardiovascular disease, and physical education teachers teach significantly more on exercise in relation to cardiovascular disease.

However, when the teachers were asked to respond to the amount of time they would like to devote to the specified topics, there was a clear indication, that most teachers would like to increase the time on topics on which they traditionally have not emphasized. For example, biology teachers would like to devote significantly more time to cardiovascular diseases, homemaking and physical education teachers would like to spend significantly more time on the cardiovascular system and, homemaking teachers would like to devote significantly more time to the individual risk factors. Health education teachers appeared to be satisfied with the amount of time they were devoting to the specified topics although were interested in increasing time allocations to some of the risk factors. Teachers who reported a desire to increase the amount of time, but were unable to do so, cited lack of time, lack of appropriate resources, constraints of the present curriculum and inflexibility of textbooks as reasons for their inability to do so. The Section contends that the

self-study format of the CCEP will in part enable teachers to increase the amount of time devoted to the specified topics without impinging on an already overcrowded curriculum. Because the units focus on cognitive information, the time freed by their use, will allow teachers to spend their contact hours with group-based activities such as role play activities, value clarification activities, decision-making activities, experiments and other non-lecturing type options which will be included in the teacher's guide. The instructional management system in essence will suggest broad parameters to teachers. Such activities will stress the application skills of evaluating, analyzing and synthesizing concepts which demand a considerable amount of interaction between students and teachers. Educating students in these experiential activities is at least as important as objective knowledge--indeed the two are indisputably intertwined.

The data from the survey reflect a growing interest among teachers to integrate the pure aspects of their disciplines with the applied aspects. This is encouraging when one considers that more than 27 million Americans have some form of heart and blood vessel disease, and that annually more than one million deaths result from heart and blood vessel disease making this the greatest cause of death in the United States. Emphasizing the importance of science to the resolution of societal problems through an integrated approach has been urged by Burkman (1972, p. 43), who points out that "present science programs tend to overemphasize pure science at the expense of applied science and technology." Although, Texas requires health education for all high school students in which both pure and applied aspects are being considered, the other disciplines clearly desire to increase the amount of time to the applied aspects. In many states, however, where health education is not mandated, health information is taught as a happenstance in science, homemaking

and physical education classes. Some states, however, do require specific separate time allocations, specified topics, as well as certification of teachers for health education (Castille and Jerrick, 1976.) Taft (1975) suggests that implementation of a meaningful and well organized health curriculum will probably lie somewhere between the two areas of study (i.e., science and health education). The data from this survey tend to support this contention.

With respect to teacher academic preparation, most teachers felt that more up-to-date knowledge of cardiovascular diseases and associated risk factors would be useful to them. Considering that it was only recently that the risk factor theory was introduced into teacher training curricula, and that most of the teachers had been teaching for ten years, this finding supports the need for initiating in-service and continuing education programs on cardiovascular disease related topics. Although the teachers reported their academic prepartaion as average (52.7 percent), 72.7 percent of the teachers explicitly requested supplementary content materials as part of the CCEP being developed. The findings also imply the need for an evaluation of teacher training programs to ascertain the extent and degree to which such programs are involved in teaching cognitive information regarding cardiovascular disease and associated risk factors. As Grobman (1970) has stated, "the lack of teacher familiarity with new, specialized subject matter, or with new teaching techniques, constitutes a real threat to appropriate implementation of materials." The Section is sensitive to this issue and, although still in formative stages, is developing appropriate implementation strategies.

The responsibility of the implementation of most instructional activities rests primarily with the teaching staff. As Atkins (1976, p. 129) has emphasized, "individualized instruction does not seem to be an exception." Based upon the data of this survey, teachers clearly will be in need of in-service training

on how to use the self-study CCEP units in order that appropriate and successful implementation of the project occur. Although teachers reported some or very little exposure to the self-study format, the fact that very little self-instruction was currently being utilized may be related to the lack of appropriate pedagogical training in its use, lack of appropriate resource materials for high school students and the cost of materials currently available to them. Teachers reported that they would utilize the CCEP materials principally as supplementary material (75.0 percent) and most of the teachers indicated a continued reluctance to replace a lecture or textbook with CCEP materials. It would appear from their response to this item, that teachers' unfamiliarity with the merits of individualized instruction and their continued reliance on traditional instructional methods might affect the success of the CCEP's implementation. This further indicates the need for effective in-service training to show teachers how to change their approach in order that CCEP materials be utilized appropriately. Underlying this reluctance may be teachers' perceptions of students collectively rather than recognizing their variation in interests, abilities, learning rates and learning styles, i.e. their individuality. As Wright (1976, p. 111) has urged "individualized instruction is much more than a chnage in methodology . . . for individualized programs to make a significant impact on students, educators must perceive students as individuals."

When teachers were asked to identify their priorities on the specific self-instructional units, their greatest interest among the core units in "Warning Signals of a Heart Attack" and least interest in "Risk Factors of Cardiovascular Disease" implies a greater concern for recognizing symptoms than in prevention of disease. This, in part, may be attributed to their perception of medicine as a profession devoted solely to curing disease and/or

to their unfamiliarity or lack of knowledge about the importance of risk factors in contributing to the high incidence of cardiovascular disease. Among the supplemental risk factor units, teachers appeared to be more interested in topics on which they have traditionally devoted classroom time. For example, among biology, health education, and physical education teachers, a greater interest was expressed for Smoking and Exercise Units and among the homemaking teachers a greater interest for the Diet and Smoking Units. This does not preclude their interest in all of the units but points out their continued interest in procuring materials on topics with which they are most familiar. This finding further indicates the need for educating the teacher and teacher trainee populations to the risk factor theory and the importance of teaching the interrelatedness of risk factors and their cumultive effect on increasing one's risk for cardiovascular disease.

Regarding suggested items to be included in the CCEP's teacher instructional management system, teachers identified their priorities for films, content information and suggested experiments. These selections reflect their interest and need for up-to-date information either through mediated forms for students or cardiovascular content oriented information for teachers for improving and increasing their own knowledge. This clearly reflects a need for continuing education for teachers on cardiovascular disease and associated risk factors. By comparison, their lesser interest in role play activities, value clarification activities, and decision making activities again reflect the reluctance of teachers to consider student directed activities as a viable educational alternative. This, in part, may be related to their unwillingness to change their instructional strategies, but also may more than likely be attributed to their unfamiliarity with the process of conducting such activities. The CCEP teachers guide currently being developed will address this problem by identifying ways by which teachers can effectively integrate such activities with cardiovascular disease education. 32

Conclusion:

This study clearly documented the degree to which cardiovascular disease related topics are currently being taught in Texas public secondary schools. It also identified disparities in certain grade levels within disciplines and among disciplines between what was currently being taught and that which was preferred or desired. The data identified an interest among the teacher respondents to integrate basic scientific information with its applied aspects. Employing self-instructional materials appears to be a logical step for meeting teachers' desires to provide alternative educational experiences within the present constraints of public school scheduling, curricula and funding. Although this survey revealed that teachers had little experience with and only occasionally used self-instructional materials, they assessed their appropriateness for use by high school students as above average to excellent. This clearly implies that the Secondary and University Education Section will need to respond to the development and implementation of appropriate in-service training programs for teachers. In addition, teachers will have to be educated to the risk factor theory either through the CCEP teachers guide, through continuing education programs, or both.

Implications for teacher training programs can also be identified. There appears to be a need for teacher training programs to include more emphasis on the merits of individualizing instruction. Teachers clearly are not committed to its educational efficacy and/or use or are simply unfamiliar with it.

In addition, the average rating by teachers of their academic preparation to teach cardiovascular disease and associated risk factors must be looked at by teacher training programs. When teachers are requesting more cardiovascular disease related content information as part of a teachers guide, there appears

to be a need for both inservice and continuing education programs on health and disease.

As a result of this survey the CCEP has been reorganized in terms of its content and length. Added emphasis has been placed on the development of the teachers' curriculum guide which will assist in the mangement and effective implementation of the self-instructional units and complementary experiential activities for students. Additionally, appropriate inservice education and continuing education programs are being developed.

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